School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

vol. VI no. 10
JUNE, 1947

Create a New Shop through Color
by F. C. Finsterbach
Teaching Surface Development
by Eugene Larson
Jobs Versus Operations
by Arthur F. Dodge
A School-Made Rapid Charger
by E. V. Walters

On the cover: A junior-high-school student in a general metal shop in the Los Angeles, California, schools, preparing to take a cut on the engine lathe.

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School Shop

FOR INDUSTRIAL EDUCATION TEACHERS

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

A State Director Looks at the George-Barden Bill

An Editorial by Ralph C. Wenrich, Assistant Superintendent for Vocational Education, State of Michigan

ON July 1, 1947, the Vocational Education Act of 1946, generally known as the George-Barden Act, will replace the George-Deen Act of 1937. It is significant that the 79th Congress replaced the George-Deen Act, which authorized an appropriation of $14,200,000, with legislation intended to provide more than double that amount for the further development of vocational education.

Regardless of how much money is appropriated by the 80th Congress to implement the George-Barden Act, the fact that the new vocational education bill was passed almost unanimously by both Houses is ample evidence that our national legislators were convinced that federal funds previously made available for vocational education were a good educational investment. The successful operation of a state program supported by federal appropriations since the passage of the Smith-Hughes Act in 1917, including the training of millions of war-production workers, has resulted in an enviable record for vocational education. There has developed over a period of years a growing acceptance of, and increased enthusiasm for, vocational education by the general public, as well as those who make our laws. The *Congressional Record* of March 25, 1947, indicates that during a discussion of an appropriation bill in the House, one representative speaking about vocational education said, "If it had not sold itself to the people, if it had not done such a wonderful job, there would not be such a genuine wholesale cry for its continuation. . . ." Later in the same discussion, another representative of the House said, "Vocational education is close to the people and should be expanded greatly in the interest of the general welfare of the people of our nation. . . . States should be encouraged to expand vocational education as a means of lifting higher the standards of living in America."

The confidence voted vocational education as manifested by the George-Barden Act is a compliment based on achievement, but it also presents a challenge and a responsibility. Certain provisions of the Act will make it possible to expand the services of vocational education which should result in the continued development of a sound program of training for occupational competence in youth and adults. Let us consider several of the new provisions.

1. The Act states, "Preemployment schools and classes organized for persons over 18 years of age or who have left the full-time school may be operated for less than nine months per year and less than 30 hours per week and without the requirement that a minimum of 50 percentum of the time must be given to shop work on a useful or productive basis." This provision was intended to give greater flexibility, insofar as time arrangements are concerned, for trade and industrial education in all-day classes.

2. The Act provides that these funds may be used "for training and work-experience training programs for out-of-school youth." This provision would permit both individual and group instruction for out-of-school youth (in school or on the job) and work experience training for out-of-school youth employed on jobs approved by the school authorities who provide supervision for the training aspects of the program.

3. The Act provides that funds may be used for purchase or rental of equipment and supplies for vocational instruction.

4. The Act provides for the use of these funds in the development of programs of vocational guidance. It is recognized that the proper selection of the persons to be trained and their vocational adjustments are among the requirements for a successful program of vocational education and that a vocational guidance program is necessary to modern selection and adjustment methods.

It should be clearly understood that each state must determine the conditions under which the new features will be implemented through its state plan.

These new provisions, as well as others included in the George-Barden Act, will make it possible for vocational education to more adequately serve the people who need and want this type of training. It behooves all vocational educators to apply intelligently these new provisions in order that the net result might be not only the further development of a vocational program, but an increased effectiveness in the service rendered.

Perspective

The next couple of months will give shop teachers a short pause in their usual duties for the so-called vacation period. For most of us it won't mean loafing, but it will mean change. With change comes an opportunity for gaining a little perspective on the old job. What have I been doing and why? Have I lost sight of my primary objective—educating youth—in a whirling mist of course outlines, projects, reports, school politics, salary increments, advanced study, surplus property, ad infinitum?

How about a little soul-searching?

As an industrial-arts instructor is the subject matter you teach as far away from real life as much so-called academic work? What connection is there between what the students are doing in your classes and what is going on outside of school? If there is a connection, do the students know about it? Do you teach for reality and broader knowledge or for somebody else's ready-made lesson plans? Do you bring the industry and the craftsmanship of your community into the shop and do you take the students outside the shop to see the community's assets of an industrial nature?

As a vocational teacher, are you abreast the latest developments in your trade? Have you visited local industry lately to talk with artisans practicing the skills you teach? Have you made an occupational analysis of your community to determine whether or not you are teaching really salable skills? Have you followed up old graduates to determine what kind of job you did for them?

Summer is a good time to think some of these things over.

As for your editor, he has some questions he would like to find the answers to. The principal one is how to give you a more useful magazine—a magazine that is educationally sound and aesthetically attractive. I'm working on it, so help me!

Your Editor

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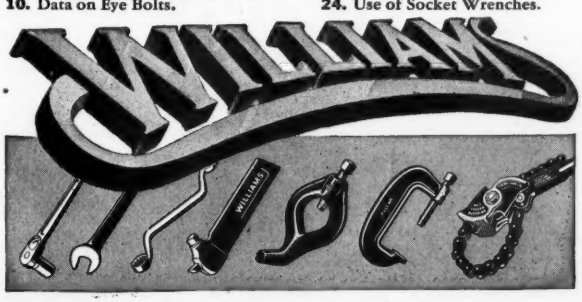

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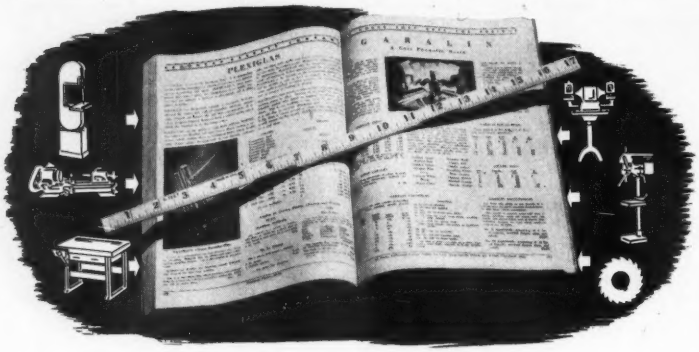

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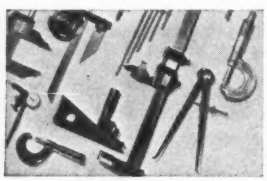

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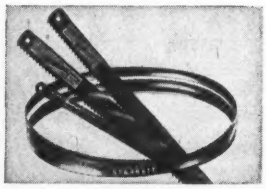

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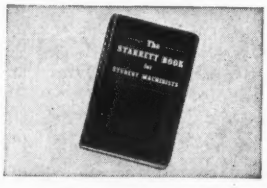

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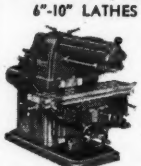

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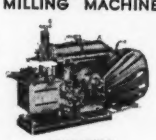

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Create a New Shop through Color

BY F. C. Finsterbach

Shop teachers are becoming increasingly aware that the appearance of their shops has instructional and public-relations implications. Color is an important factor. This study shows conclusively the value of color. F. C. Finsterbach teaches industrial arts at the New York State Teachers College, Buffalo.

THE functional use of color to promote efficiency, morale, and safety is a relatively new concept in industry and a distinct challenge to those of us who are engaged in education. It is only recently that the functional use of color has made its appearance in architecture, in home furnishing, in packaging, and in lighting. While the psychological effect of color has been known for centuries, little practical use has been made of this knowledge until now.

The theater, the cinema, and certain industries have been quick to accept the functional possibilities of color and have put color to work. In the shops of the Burlington and Quincy Railroad all gears, wheels, clutches, and moving parts of machines are painted yellow and their guards a brilliant red. Whenever yellow shows, it indicates an unguarded spot. The U. S. Bureau of Mines has adopted a color code for governing types of gas masks. The radio industry uses color coding on its wiring and some of its smaller condensers. The foundry industry has formulated colors for patterns to denote the type of finish to be applied to castings. The Navy has for many years used color to code its pennants and has standardized colors for piping of all kinds aboard ships.

Amazing results have been achieved in the use of color in the preparation of foods, in the packaging of material, in the prevention of flying sickness, and in the treatment of mental illness. Accidents in welding are prevented by the simple use of green and red to distinguish hoses. Evaporation in gasoline tanks has been minimized by the use of white paint, while black paint has been utilized to open ice-locked channels for ships.

Color affects our daily lives far more than we surmise and color, with its infinite shades and tints, has potentially greater force on our emotions than music and speech.

The demands of business for higher production, less waste, improved human relations, and reduced accident hazards are being met increasingly well through the functional use of color. It seems apparent that what is proving so helpful in industrial relations might also have some valuable contributions to make in the field of education, especially in the divisions of vocational-industrial and in industrial arts. We can hardly deny that less waste, higher standards of performance, improved morale, and fewer accidents are as highly desirable in education as they are in other fields of human endeavor.

Color Lacking

The scientific application of color to achieve functional effect in our schools is evidenced mostly by its complete absence, particularly in our school shops. The neglect to use color is due not only to lack of knowledge on the part of the teacher but to causes sometimes beyond the control of the teacher. The apparent addiction of school authorities to tans, browns, and mustard greens; the grays and blacks almost universally applied to machines; the drab greens of filing cases and lockers and the dark mission oak of school furniture have each made a *negative* contribution to the *light* of education!

The causes for this conservatism in the use of colors in schools may be as deep rooted as some of our other patterns. They might even lie within the realm of masculine psychology for, while the male of other species bedecks himself gaily in color, *Genus Homo* somehow remains content with a minimum. While he may love flowers like Ferdinand the Bull, he seems afraid to face reality and use color in his daily life.

We all know the universal language of color. We know too that a large part of our perception is visual and that order and equilibrium are dependent on correct perception. In an off-hand way we feel the effect of color and respond psychologically in almost definite patterns. For example: We associate *gray* with old age, with neutrality, with decay and death. *Red* is a universal danger signal because of its association with blood. As youngsters we learned the meaning of the *yellow streak* and *green with envy*. We perhaps turned *red* with rage and sickly *white* with our first smoke. The *orange* and *yellow* and *red* of the sunlight warmed and brightened our spirits while rainy days left us feeling *blue*. The contentment of *green* fields; the serenity of *blue* skies overhead; the *blackness* of base deeds and of the night, all of these formed a pattern of experience familiar to most of us.

Thus we learned the language of color as children. Somewhere along the line we sidetracked it as we gained maturity

This corner of the comprehensive general shop in the Buffalo State Teachers College has a northern exposure so the walls are painted lemon yellow and the ceiling white with beige on the base of the workbenches. The wearing surfaces on the tool panel and the kick strips on the bench are painted vista green.

and the absurd dignity which accompanies it. If we didn't lose it altogether, we use it only in an academic sense while we indulge secretly in riotous display of color on our underwear, of all places. Color, however, is used precious little in schools wherever men have held sway.

We Drown in Brown

This is an indictment of our sex. With technology far advanced; with a world of color at our disposal; in face of the incredible economy of paint and the infinite variety of color available we continue to drown "cheer" in a bath of chocolate brown, frothed with gray. This is the picture and we need only to look at our school shops for verification.

We see on every hand that not only have we leaned toward conservatism in the use of color but have fallen overboard in that direction. Prompted, no doubt, by the gray on manufactured machines and the brown or tan of the school building, we have achieved in our efforts to be consistent (and sometimes to use up old paint), an effect in gloom and dreariness surpassed only by a prison cell of a bygone century.

Very few of us have dared to depart from the accepted "color schemes" either from fear of ridicule or from a feeling of insecurity about the functional use of color. For the timid of heart, we can only offer Dryden's:

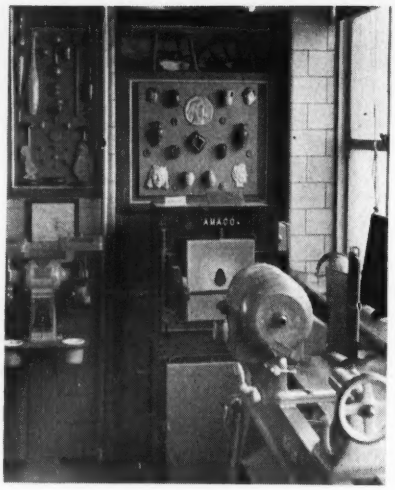
> And though he stumbles in full career,
> Yet rashness is a better fault than fear.

For the insecure, the following study in functional color might provide the necessary practical data to establish a background of knowledge sufficient for departure into the magic land of color; a land where color talks and functions to cheer the weary, save the eyes, and stimulate the mind.

Color Studied

A study was undertaken in 1943-44 by the writer in order to determine the need for, and the effect of, functional color in the industrial-arts shop. To obtain comparative data it was necessary to extend the study over a period of two years during which time machinery and equipment in a pilot shop were completely analyzed, cleaned, and repainted. Photographic record, in black and white, preceded the painting. After the color effect was achieved, color photography and light measurement verified the results.

To meet the need for basic factual data regarding the present use of color in industrial-arts shops, a field survey was made by questionnaire of 250 school shops in New York State, exclusive of large cities. A total of 212 replies was received and some of the data are compiled from this source. An effort was made to establish data concerning:



This section of the shop in School 18, Buffalo, shows the application of color dynamics. The grinder base is painted vista green and the top is beige. The guards are green with white interior to reflect light. The water pots are white enameled on the inside. A gain of 75 percent in light value came after this treatment. The lathe has the adjusting handles painted yellow and the dial white with black letters. The body is green, with the switch box red and the insides of the ways cream. The backboard is focal green to contrast with the natural wood being turned.

1. The appropriateness of wall colors with relation to geographic exposure.
2. The colors of finish now used on machines.
3. The extent of color use on machines to designate controls and safety devices.
4. The use of color to distinguish between kinds of tools and divisions of work.
5. The extent of teacher awareness to the idea of functional color (color dynamics).
6. The relative desire of teachers for rooms and machines painted according to the principles of functionalism.
7. The candid opinion of teachers with regard to a system of color dynamics proposed by a prominent paint manufacturer.

Data about the energy of color, the impressions made by color, the likes and dislikes for color were gathered from student sources in the writer's shop. At the same time, current literature, trade magazines, and newspapers were searched to establish the extent to which industry had made use of the principles of functional color.

The field survey showed that teachers were willing to experiment with colors in a functional sense and the pilot study of machines and equipment indicated possibilities in treatment. The guidance of a color expert from the Pittsburgh Plate Glass Company was secured and the principles of color dynamics as outlined in brochures of the company formed the basis for the study.

Wall Colors

The results of the questionnaire with relation to item one revealed certain misapplication of color when compared with usual colors suitable for certain geographic exposures. Many shops having an exposure to cool north or east light reported the use of cold colors such as green or blue on the walls of the shop. On the other hand, shops having a warm west or south light reported reds, browns, and yellows on the walls. With the evidence of common agreement setting the standard, colors used with north light were incorrect in 82 percent of the cases. For east exposure, 78 percent were inappropriate. For south light, 71 percent were incorrect. For west light, 52 percent were in error. The standard used was that warm, advancing colors are best suited for cool exposures (north and east), and that cool, receding colors are beneficial to warm exposures (south and west). Whether these misapplications of color indicate a need for more color knowledge on the part of shop teachers is a moot question. As a rule, the teacher takes the room as he finds it with color choice determined by the architect or the maintenance division.

Just which colors are applied to school shop walls would be of little concern if only physical factors were considered. But color has been found to cause human reactions of a psychological nature. These reactions can be measured, controlled, and manipulated, just as the energy of color can be measured in a physical sense.

To check clinically the color reaction of those most likely to be influenced, 175 students of industrial arts were shown large samples of colors and asked to classify them as "stimulating," "restful," "calming," "exciting," etc. The results of the test indicated that red, orange, and yellow were considered predominately "exciting." Blue, green, and violet (purple) were considered "restful" by a slight majority while black and brown received the most "undecided" responses.

Using the same method, a further check was made to determine color preferances. Blue and red in that order were preferred or liked preponderantly out of nine colors. This preference for blue (42 percent) and for red (27 percent) is nearly the same as disclosed by a more extensive study by Winch of the

"Color Reactions of Men." A similar test of school children, also conducted by Winch, shows blue and red to be the leading choice of colors.

Since these tests tend to indicate color perception, some emotional reaction, and relatively strong preference, it is perhaps possible to conclude that the impact of color should be considered together with the natural light exposure when paint is applied to the walls of a school shop.

Machine Colors

A medium gray, commonly called "machinery gray," is the predominant color used on the type of machines found in school shops. Before World War II, a few companies began to deviate from the practice to use a dark green or black as a basic finish. During the war the so called "victory gray" was again used by government regulation.

In order to determine the extent of variation from gray which might exist on school machinery, a question about the finish was included. The response to this question reveals that 154 shops, or 66 percent of the sample, have gray as a finish on machines. Green shows next with 48 cases, followed by black with 18.

In response to a question about the marking of machine controls, guards, and starting devices with color, 120 reported no use of color in this respect. Of those who did use color, red was predominant with orange, cream, black, blue, yellow, and white being mentioned. The application of yellow as a color signifying "caution" was disclosed in only four cases. Red as a danger signal appeared as applied to guards and switch boxes. The variety of colors used signifies that while some teachers attempt to make color function there is lack of common agreement as to the psychological meaning of particular colors. This is probably due to the fact that functionalism has been missing from color literature and because so few facts have been established on the basis of investigation and experimentation. So much about color is described as "theory" that it is small wonder that the layman remains confused. As one respondent so aptly put it, "I like color and would use more of it in my shop but I am uncertain about which colors to use where."

It is probable that this statement represents the sentiment of many teachers and that it indicates the need for more research and direct guidance in the use of color.

Color for Tools and Work Areas

In contrast to the relatively low number using colors on machines for controls or guards, 72 percent reported use of color as a means for identifying tools or work areas.

Slightly over 80 percent of the respondents reported acquaintance with the terms "Color Dynamics" and "Functional Color" through reading brochures distributed by paint companies. Of the 170 who were familiar with the subject, 112 expressed complete approval. Two were outright unfavorable and 48 were doubtful of its complete merit. There was definite indication of the application of complete functional coloring in four shops and 21 mentioned it as planned for the near future.

A strong affirmative response favoring the coloring of machines by the manufacturer was brought forth. These responses from the field seem to indicate a general readiness on the part of shop teachers to accept the application of functional color to shops, areas, and machines.

Light Gain Studied

The second phase of the study centered around repainting a typical shop and its equipment according to functional color principles. To make factual data available, a preliminary light study was made of each machine and working area. Areas were marked for treatment and, after changes were made, light measurements were repeated to find the gain or loss. With 24 machines or distinct areas studied, the total pick-up in light value was 32.10 foot-candles or an average gain of 79 percent. In terms of sight-saving, greater visibility, and safety, this gain is truly worthwhile, not to mention the psychological lift from more pleasant surroundings.

In general the treatment accorded the various machines and equipment centered around the type of material worked on, the intensity of light falling on the surface, and the relative "hardness" or "softness" of the work being done. To throw greater light on the floor around tables and benches, the undersides of tops were painted white. Cabinets, drawers, and the ends of cupboards were treated likewise to capture as much light as possible. This extended even to the divisions in printing type cases to provide greater contrast and cleanliness for the type.

All manual controls of machines were enameled yellow to indicate that *caution* was to be employed in their use. This provided not only better "see-ability" but prevented the forcing of controls by improper releasing of lock levers, etc. The starting switches and electric control boxes were painted red to indicate danger. Red was also used on all guards with the addition of cream on the insides to throw greater light on the work. Machine bodies were painted a soft durable green called "vista green" and highlighted where necessary with cream to throw light on the work. Lubrication points were indicated by orange, and lubricant containers were colored to

A view of the shop in School 18, Buffalo, showing the effect of color on the band saw. The underside of the frame is painted focal ivory for reflective value to table. Controls and adjustments are focal yellow with the switch box red and area around buttons cream for better contrast. The body of the machine is vista green. A 15-percent gain in light value was achieved through this repainting.

match so as to prevent mistakes.

Tops of benches intended for "soft" work (paper, leather, study) were covered with vista green. The bodies were done in beige with the end of some rendered in cream for greater light value in corners. Benches intended for "hard" usage were finished natural with shellac and wax on the top, with beige for the bases. Kick strips were provided in green. Red lines were added around each machine to mark out safety zones.

Colored folders were also added to distinguish different kinds of activities. The tools peculiar to each activity were painted to correspond. This made for better control of filing and tool check up. The colors selected for folders were arbitrary and based on standard colors available in packages 12" x 18". These folded into 9" x 12" size and fitted the files conveniently. The next step was to key related material and instruction sheets to these folders.

Effect Noticeable

Thus color was made to function in a typical school shop and the effects were immediately noticeable. In the first place, the glare and heat of the western light was tempered by the use of green. The darkness of the mission-oak furniture was relieved by the beige color. Light was reflected toward the floor from the undersides of tables and benches. The farthermost corners of cupboards and drawers were revealed by the use of cream or white. Dark corners were lighted up by reflected light from ends of cupboards and benches done in cream.

Better contrast was achieved for the working of materials on machines. The consistent use of yellow on all manual controls and levers of machines, of red on electric controls and guards, and of orange on lubricating devices did much to prevent accidents and mistakes.

Actual student participation in the changes did affect the morale and greater pride and better care of equipment was evident. Many of the maintenance chores were lightened by the improved conditions. The effect on visitors was marked by the interest and intensity of questions about the color effects. The extensive study of the machines and work areas for color brought about many additional improvements as to position, height, location of guards, and uniformity of electric starting controls.

More Maintenance Not Necessary

No appreciable increase in maintenance was made necessary by the use of lighter colors due to the fundamental premise that dirt exists whether it is seen or not. If it shows quicker on light surfaces than on dark, it is cleaned more often and a healthier condition exists.

As John Warren Sharpe points out, "Color, properly used, can produce ideal conditions for learning." He deplores the general drabness of school-rooms.

It does seem absurd that the school, so concerned with the *whole child*—emotionally, psychologically, physically, and socially—does not make better use of some of the extensive research that has been done, not only in color but in light and vision as well.

Can we, as teachers or administrators, really afford to ignore the psychological value and educational advantages inherent in the functional use of color? If color, as research has proved, can make well people ill and sick people well; if it can lift a person out of a mental depression or drive another to hysteria, it must indeed be a potent force in human experience. Why not make proper and improved use of this energy for the benefit of the school child. Where is there a better place to begin?

Note

Please add the following companies under the proper categories to the Suppliers Directory which appeared in our April, 1947, issue:

Solders and Fluxes

Wildberg Bros. Smelting and Refining Co., 742 Market St., San Francisco 2, Cal.; 635 S. Hill St., Los Angeles 14, Calif.

Testing Instruments

Milo Radio and Electronics Corp., 200 Greenwich St., New York 7, N.Y.

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Teaching Surface Development

BY *Eugene Larson*

Visual aids are particularly effective in teaching surface development, the author found. Eugene Larson teaches drafting at the Ann Arbor, Michigan, High School.

SURFACE development or sheetmetal drafting is an important phase of a course in mechanical drafting. Visual technics can be useful in teaching this phase of the work. The writer has used two aids which have been very helpful.

The first of these consists of having the pupil construct a model of the article to be drawn out of oil-treated modeling clay. This can be done very readily by the pupil or the instructor and the resulting model used as an aid in the visualization of the object to be drawn. This helps to overcome one of the major problems of the student which is proper visualization of the object. Reference points, joints, corners, etc., can be pressed in easily with the point of a pencil or the edge of a knife. If an error is made, it is easily corrected by smoothing out the clay and starting over. When the model is completed, the necessary views and developments can be decided on and appropriate sketches made. This device is not new in drafting classes but some teachers have probably overlooked the real instructional value it has, if used properly.

The second technic which has been found useful involves another application of the foregoing model-building procedure. The problem of making a mechanical drawing is relatively simple if a good sketch of the object is available. However, when the drawing is completed, the question arises whether or not it is correct and, if not, in what respect it is wrong.

Here again the student makes his own model and uses it to check his work. After the checking has been done, a pencil tracing is made which constitutes the finished plate. The development is then cut out from the original drawing, allowing for laps, seams, hems, etc., in much the same manner as would be used by the sheetmetal worker in actual practice. The various parts which have been cut out can then be assembled with the aid of paste or scotch tape. The result should be a perfect model of the problem. If the parts do not scale up accurately, reference can be made to the tracing, the errors discovered, and corrections made.

The use of these visual aids will result in more pupil interest, more accurate work, and, most important, the students will have a better understanding of what they have been doing.

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Jobs *Versus* Operations

BY *Arthur F. Dodge*

One of the major problems in industrial education is terminology. The discussion here should help to clear up some of the misunderstandings that plague us. Arthur F. Dodge is Associate Professor of Industrial Education, University of Illinois.

THERE is still much confusion in the field of industrial education in the use of these two terms: *jobs, operations.* Some of this confusion arises from the writings and teachings of the two men who have made the most outstanding contributions to the methods of trade analysis and trade course organization.

Charles R. Allen, in his text, *The Instructor, the Man, and the Job,* published first in 1919, asserts that a trade may be analyzed by listing all the *jobs* a skilled man in that trade may be called on to perform. A trade course therefore, according to Allen, consists simply in teaching these jobs to the prospective journeyman.

Selvidge, however, makes the assertion that "the analysis of a skilled trade on the *job* basis (is) wholly inadequate and unsatisfactory for the purpose of instruction."[1] He goes on further to state that the only satisfactory trade analysis for the purpose of instruction must be made on the basis of *operations.*

It is because of such apparently conflicting statements that even now there continues to be confusion in the use of the two terms, *job* and *operation.*

First it should be pointed out that the disagreement between these two authors is mainly with respect to a definition of terms and not with respect to any fundamental difference as to how a trade should be analyzed or how a trade should be taught. Allen's *jobs* are essentially the same as Selvidge's *operations.* It should be noted that Allen's definition of a *job* is "anything a man is paid to do"[2] not anything a man is paid to *make.* In fact, Allen seems to use the terms *operation* and *job* interchangeably. For example, he states that when a learner has been taught a job "the learner will have learned how to do some sort of a job, or how to perform some operation."[3] Following is a list of some of Allen's so-called *jobs* as mentioned in his text, *The Instructor, the Man, and the Job:* how to lay off a 90° angle (page 127); starting and stopping an electric drill (page 127); how to make a Western Union splice (page 127); building up a forge fire (page 128); cleaning out a forge fire (page 128); operating a forge fire (page 128); making a dovetail joint (page 174); laying up stock for gluing (page 198).

In order to show that Allen's *jobs* are essentially the same as Selvidge's *operations,* a second list follows of comparable operations taken from *Standards of Attainment in Industrial Arts Teaching,* a bulletin of the American Vocational Association (1934), written by a committee of which Selvidge was a member: bisect an angle (page 17)[4]; start and stop a drill press (page 35)[4]; make a Western Union splice (page 26)[4]; build and maintain a forge fire (page 37)[4]; make a dowel joint (page 19)[4]; glue up

[1]Selvidge, R. W., *Individual Instruction Sheets.* Peoria, Illinois: The Manual Arts Press, 1937. Page 17.

[2]Allen, Charles R., *The Instructor, the Man, and the Job.* New York: J. B. Lippincott Co., 1945. Page 47.

[3]*Ibid., Page* 173.

[4]These page numbers refer to *Improving Instruction in Industrial Arts,* a bulletin of The American Vocational Association (1946) which is a revision of the original 1934 bulletin. The operations quoted above are found in both bulletins.

You'll sense—instantly—a sure "feel" of lightweight power and bulk-free balance the moment you pick up this new FLEX HANDLE! It's just one of the many redesigned members of this famous Line.

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work (page 59)'. Who is able to detect any essential difference between these two lists? It seems probable that Allen, in his selection of the term *job*, was attempting to use simple, common shop terms and to avoid any terms that might carry a school implication.

Thus, the disagreement between Allen and Selvidge appears to be largely a matter of terminology. It is unfortunate that Allen should have used the word *job*, which has so many meanings, for the name of the unit skills into which a trade may be divided. Selvidge's term *operation* seems much more appropriate, and it is hoped that this term will be universally accepted as meaning a unit of skill and particularly a unit of skill suitable for the subject of a single lesson.

Dictionary definitions of *operation* are: a mode of action, a series of acts to effect a certain purpose, a process. A dictionary definition of *job* is: a piece of work done, or to be done, as a whole. Thus, the word *job* should be used to indicate the material thing which is made or completed as the result of a series of operations. The operations, the ways of doing, or the skills are nonmaterial things; while the jobs or completed pieces of work are material things—made of wood or steel or other material or combination of materials, with certain specific dimensions. If this distinction is adhered to, there will be little confusion in the use of these terms.

From the definitions of job and operation in the preceding paragraph, it is clear that the term *operation* should refer to the skills that must be taught and that the *jobs* assigned and completed by the learners are simply the vehicles or means for placing before the learner the particular operations or skills which the instructor wishes to teach.

In conclusion, it is proposed that the term *operation* be considered as having the following characteristics:

1. An operation is simply a way of doing something.
2. It is not a material thing (as opposed to a job).
3. It is not composed of metal, wood, or any other material.
4. It has no specific dimensions.
5. It occurs frequently in the trade.
6. Once the operation is learned, it may be applied to many different jobs.

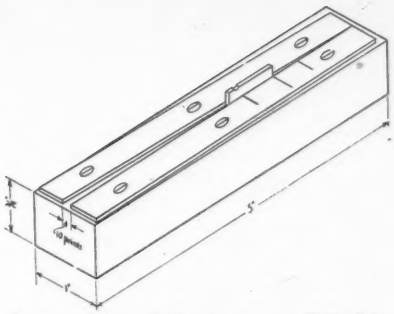
Also, it is proposed that the term *job* be used only as referring to the material "project" or "piece of work done or to be done."

BUY SAVINGS BONDS AND STAMPS TODAY—BE *SMART*

Are Your Space Cases Mixed?

BY *Hartley E. Jackson*

Here is an easily made little device that will help printing teachers with the problem of keeping type cases clean. Hartley E. Jackson is a member of the Industrial Arts Department of San Jose, California, State College.



TESTER PROJECT

PRINTING teachers in industrial arts classes know how difficult it is to keep the several thicknesses of bodytype spaces in their proper boxes. The home-made device described here helps to accomplish this, without having to train students in a

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skill that is unimportant in the guidance and exploratory programs of industrial arts.

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The "taper" of this simple gauge is planned so that a difference of a thousandth of an inch in the thickness of a space makes approximately a thirty-second of an inch difference in the distance the space will move along the V.

To use the gauge, spaces of a given point size are slid along between the sides of the V until they stop. Pencil marks on the brass serve to classify the various sizes. When changing from one point-size to another, the pencil marks are erased and new ones made.

In distributing type the 3-to-em, 4-to-em, and 5-to-em spaces may all be dropped in the 3-to-em box, then removed, separated by use of the gauge, and then replaced in their proper boxes.

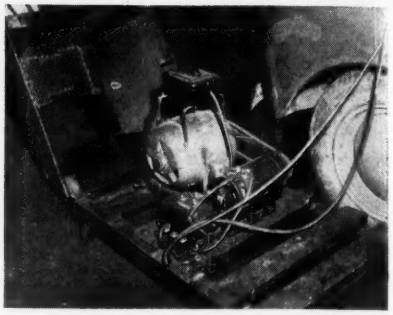
Your Editor Visiting Germany

At the invitation of the War Department, Lawrence W. Prakken, Editor of SCHOOL SHOP, is now in Germany and Austria observing the operation of school systems. He will bring you a report on industrial education in the September issue.

A School-Made Rapid Charger

BY *E. V. Walters*

This ingenious device was designed by the author, who is assistant department head, and built by N. J. Peters, automobile-mechanics teachers in the Wilbur Wright Vocational High School, Detroit, Michigan. The cost was nominal and the results were excellent.



TESTED INDUSTRIAL PROJECT

MOST school auto shops are equipped with a slow battery charger, but the newer fast charger is rapidly becoming most popular in service stations.

Our budget did not provide for a new fast charger so we designed and constructed one which has been performing very nicely. The set-up is merely an adaptation of a charging circuit on a modern automobile with a high-capacity generator.

The layout is simple, consisting of a 1-horsepower, 110-volt, single-phase motor connected by a v-belt to a 40-ampere capacity, 6-volt generator and voltage-current regulator. The regulator was used on a Jeep and was obtained through war surplus. The component parts are mounted on a stand having casters as shown in the picture for ready portability. A plywood and wire-mesh guard fits around the parts when the charger is operating.

There has been some question about the quick charging of batteries. A. C. Olsen of the Detroit Service Division for Exide Batteries states: "High-rate charging of storage batteries has been used by service stations for some time, and, if used correctly so that the rate is controlled and tapers off as the battery becomes charged (temperature not allowed to go over 125° F.), it will not harm a (good) battery."

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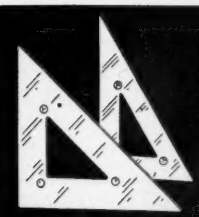

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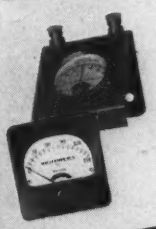

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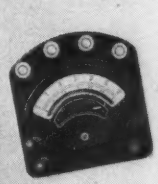

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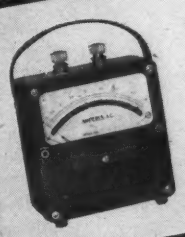

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NEWS

What's Doing in the Field of INDUSTRIAL EDUCATION

AIAA Holds Meeting

HOLDING its first postwar membership meeting, the American Industrial Arts Association convened for a three-day session April 24-26 at the Neil House in Columbus, Ohio. The Ohio Industrial Arts Association met with the national association. Approximately three hundred persons registered for the sessions which were largely devoted to a discussion of a new industrial-arts curriculum developed under the auspices of the industrial-arts department at Ohio State University. Problems of the one-man or rural high-school program were also discussed as was the preparation of a statement on "The American Program of Industrial Arts Education." John A. Whitesel of Miami University was elected president. Walter R. Williams, Jr., of the University of Florida was elected vice-president and the new secretary-treasurer will be D. Arthur Bricker of the Cincinnati, Ohio, schools.

Penn State Announcement

THE 1947 summer session of Pennsylvania State College will offer both graduate and undergraduate work in vocational-industrial and in industrial-arts education, according to a recent announcement from the college. Several intensive courses, one, two, and three weeks in length, have also been arranged for the session. The announcement states that students may take the series as arranged or they may make selections of one or two courses from the group. Visiting instructors in vocational-industrial education will include L. S. Hawkins and J. C. Wright, formerly of the U. S. Office of Education; R. M. Knoebel, director of vocational education, Sunbury, Pa.; E. B. Porter of the U. S. Bureau of Vocational Rehabilitation; E. J. Spady, director of vocational education, Oklahoma City; and C. F. Zinn, director of vocational education, Chester, Pa. Visiting instructors in industrial arts will include W. E. Caswell, McDonogh, Md., school; F. C. Moore, supervisor of industrial arts, Cleveland; and S. J. Pawelek, supervisor of industrial education, Baltimore.

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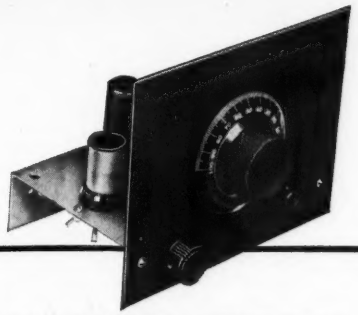
ABOUT YOUR FELLOW TEACHERS

ROBERT E. SMITH, professor of education in the area of industrial arts and vocational education at Ohio State University, is retiring at the close of the present academic year. . . . F. W. KELLER, director of the Sturgeon Bay, Wis., Vocational School, has been named superintendent of the Sturgeon Bay schools. . . . PAUL C. NELSON, professor of industrial education at the Stout Institute, Menomonie, Wis., died recently. . . . CLAUDE A. BOSWORTH, director of industrial education, Muskegon, Mich., has been elected president of the Michigan Industrial Education Society. . . . MARIS M. PROFFITT, former specialist in industrial arts, has retired as assistant director of the division of secondary education, U. S. Office of Education. . . . FRED J. SCHMIDT has been named head of the department of industrial arts at Ball State Teachers College, Muncie, Ind., on the retirement of Orville E. Sink. . . . LAYTON S. HAWKINS, assistant director, field service operations, Vocational Division, U. S. Office of Education, is retiring this month and will join the American Technical Society, Chicago, as research director.



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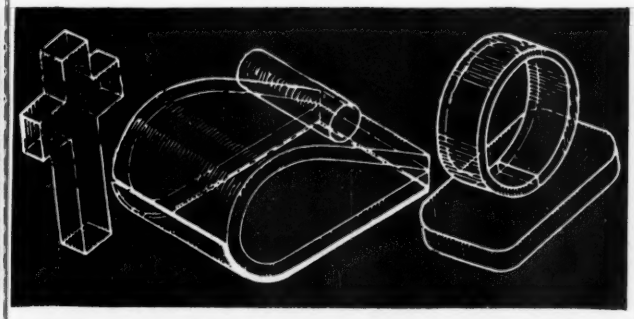

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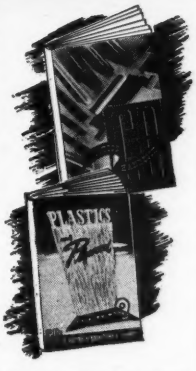

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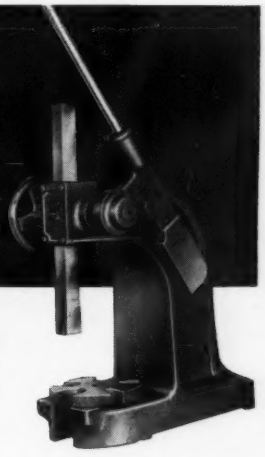

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From Washington—Continued

made soon if the United States is to maintain its leadership as a strong nation, runs the argument now. In other words, the federal government must step into the education picture for international reasons, if not for domestic.

A difference of opinion lies in the answer to the question as to what will assure national strength. Is it (1) a healthy, literate citizenry, skilled in the arts of production and alert to the responsibilities of democracy? Or is it (2) a large reserve of youth trained by the Army to be prepared for what is politely called "emergencies?"

Proponents of federal aid to schools argue that national security can be assured by strengthening all phases of children's education, with the help of about $300,000,000 a year from the U. S. Treasury. The War Department is arguing in favor of the second alternative, calling for a training program which may cost a billion a year.

When SCHOOL SHOP readers return to their posts in September these two issues should be clarified. For, by Fall, the testimony and the arguments on about a score or more bills which seek federal aid to education will be on the records. The time will be ripe for action.

By Fall, too, the Congress will have the report of the President's Advisory Commission on Universal Training (note that the official title omits the word "military"). It will also have before it the results of the experiment in universal training which the Army is conducting at Fort Knox with 600 volunteer youths.

Indications are at present, therefore, that the winter of 1947-1948 may be one of decision on vital issues affecting youth, their teachers, and their schools.

IN THE Morning Mail . .

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Gentlemen:

I want to thank you for all your effort in behalf of my husband who is a missionary in Burma. I wrote for certain pamphlets and literature advertised in your magazine . . . and all the firms have been especially considerate in sending my husband information that is very helpful to him in his work. My husband wrote that he had taken out with him on the plane (even with the stringent limitation on baggage) a copy of your June, 1946, issue. This had a very valuable directory of places of all kinds to get vocational education supplies and excellent shop plans. He carried it along with him to study and lost it on a native launch. He asked me to write you for another one to be sent to him directly at Nichols Sgaw Karen High School, Bassein, Burma.

We are very grateful for all help in this tre-

(*Continued on page* 23)

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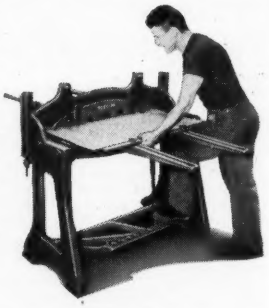

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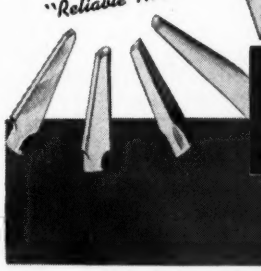

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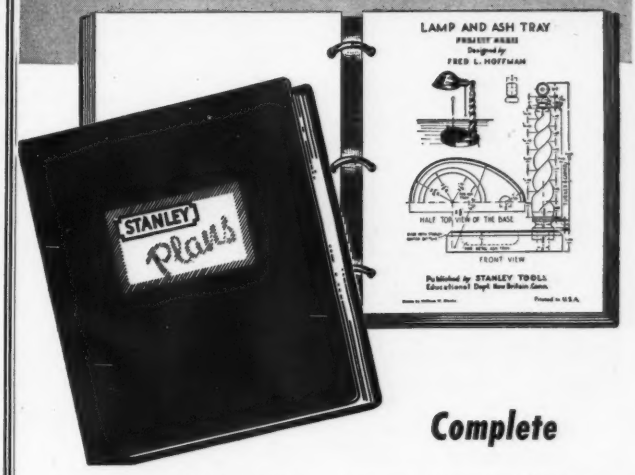

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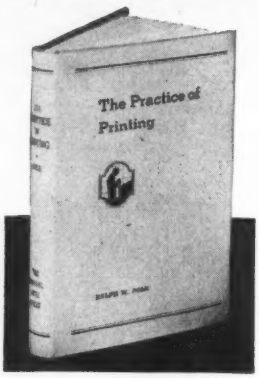

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Instructional RESOURCES

Teaching the Industrial Arts. Ericson. Peoria: The Manual Arts Press, 1946. Pp. 384. $4.00.

The first portion of this book deals in chronological order with the problems of teaching from the opening day of school to the closing of the shop at the end of the school year. Such topics are covered as methods and procedures, discipline, class management, teaching aids, safety, related information, testing, and teaching efficiency.

The second portion of the book covers the general background of shop instruction and activities outside the classroom. Such topics are included as objectives, courses of study, subject-matter analysis, equipment and planning, and public relations.

Problems and questions are carried at the end of each chapter. The author espouses no fetishes in industrial-arts teaching, but has attempted to give an over-all view of the task of teaching shopwork. The beginning teacher and the student preparing to teach will find the material very valuable.

Emanuel E. Ericson is professor of industrial education, University of California, Santa Barbara College.

Plastic Craft. DeWick and Cooper. New York: The Macmillan Co., 1946. Pp. xxi+184. $5.00.

This is a fascinating book for the shop teacher interested in using plastics in his teaching program. It includes how-to-do-it instructions for numerous projects and processes, as well as much information on the characteristics and availability of various plastics. The book grew out of a course in the use of plastics for the inservice training of industrial-arts teachers which was taught by one of the authors.

A section is devoted to detailed instruction on the processes and tools used in working plastics with step-by-step illustrations used extensively. Means of coloring plastics are also described. An unusual feature of the book is the description of art technics in such fields as etching and painting. Sources of supply for equipment and materials are listed.

Ernest S. DeWick teaches industrial arts and John Cooper teaches art in the Rahway, N.J., High School.

The Production and Properties of Plastics. Kaye. Scranton, Pa.: International Textbook Co., 1947. Pp. xi+612. $4.00.

This is a technical discussion of the manufacturing of materials out of plastics and would be particularly useful in a vocational course in the subject. The chemical make-up of various plastics is covered as well as design and commercial production methods commonly in use. Industrial-arts teachers will find much background information in the book. A directory of plastic trade names, an excellent glossary, and a selected bibliography are included in the appendices.

S. Leon Kaye is president, Kaye Plastics Corp.

Jewelry Making and Design. Rose and Cirino. Worcester, Mass.: The Davis Press, Inc., 1946. Pp. xx+409. $8.95. Revised edition.

Presented in handbook form, this volume covers both the making and design of jewelry. The problem method is used in the section on jewelry making with 25 problems and projects described in detail. Numerous illustrations and carefully prepared textual matter show students how to file, saw, bend, carve, emboss, solder, set stones, polish, cast, model, hub and die cut, and stamp jewelry, and the application of designs. A large section of the book is devoted to jewelry design, covering details from methods of drawing to the "fitting" of the design to the jewelry.

The late Augustus F. Rose was head of the Department of Jewelry and Silversmithing, Rhode Island School of Design, and Director of Manual Arts, Providence, R.I., Public Schools. Antonio Cirino is head of the Division of Teacher Education, Rhode Island School of Design.

The Use of Machinery's Handbook by Alex Leuchtman of the Wilbur Wright Vocational School, Detroit, Michigan, and A. A. Vezzani, Lecturer in Industrial Education, University of Michigan, is a 57-page manual of lesson sheets designed to aid the student or apprentice in using *Machinery's Handbook*. The manual is intended to help the student by giving information regarding the use of various parts of the *Handbook* together with examples of use and problems. The *Manual* is divided into a series of 18 lessons. The material was compiled for the Automotive Tool and Die Joint Committee representing the Automotive Tool and Die Manufacturers Association and Locals No. 155 and 157 of the UAW-CIO. Copies may be secured from A. A. Vezzani, School of Education, University of Michigan, Ann Arbor, for $1.00. A discount of 20 percent applies on orders for five or more.

Accuracy and the Geometry of Precision is a pamphlet by E. Willard Pennington, Technical Editor of the *Tool and Die Journal*, which contains a historical discussion of the development of accuracy in machine-shop work, particularly in the producing of surface plates and master squares. A section is also devoted to producing angles other than squares. Numerous diagrams are used to illustrate procedures. Copies of the pamphlet may be obtained from American Industrial Publishers, 321 Fairmount-Cedar Bldg., Cleveland 6, Ohio, for 35 cents each.

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*School*_____

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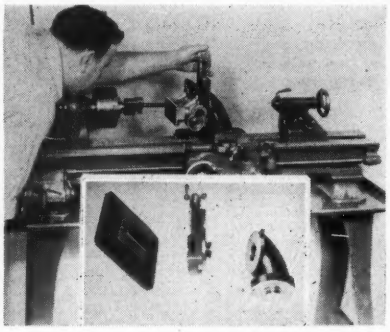
News from INDUSTRY

Attachment Converts Small Lathes

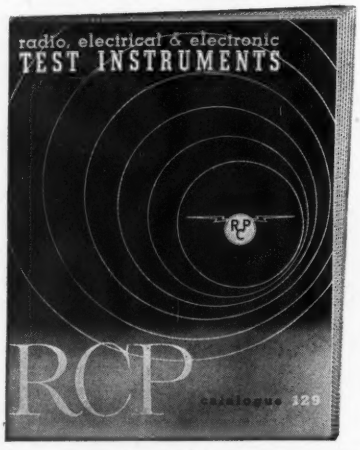
Precision boring and milling can now be performed on practically any small machine lathe by use of a new adaptor being manufactured by Qualified Gage Co., Berkley, Michigan.

The "Shop Hand," as the adaptor is known, provides for both vertical and horizontal movement of the work. An "L" (one of the two parts of the adaptor) mounts on the cross slide in place of the compound. The compound, which has been removed from the cross slide, attaches to the opposite end of the "L" in vertical position. A face plate (second part of the adaptor) attaches to the compound holding the part to be machined.



Adaptors are available with "L's" having connections to fit all popular makes of lathes. For complete details, write Qualified Gage Co., Berkley, Michigan, mentioning SCHOOL SHOP; *or check no. 59 on the coupon.*

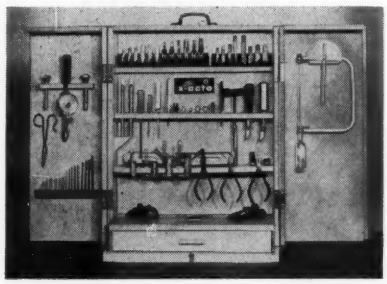
Test Instrument Catalog



A very comprehensive list of test instruments is featured in the Radio City Products Company's new catalog, No. 129. Along with all of the latest, improved RCP models, the new catalog carries in addition a complete listing of the Reiner line of precision equipment.

Copies of the new catalog may be obtained from Radio City Products Co., Inc., 127 West 26th St., New York, N. Y.; *or by circling no. 60 on the coupon.*

New X-Acto Tool Cabinet



The new X-Acto No. 89 cabinet is a complete workshop of small hand tools. It contains, in addition to a wide assortment of X-Acto knives, blades, gouges, routers, and punchers, all of the many other X-Acto tools such as drills, block planer, saw, spokeshave, sanders, pliers, tweezers, and other tools necessary for a complete crafts program.

For full information as to price and availability, write X-Acto Crescent Products Company, Inc., 440 Fourth Ave., N. Y. 16, N. Y.; *or check no. 61 on the coupon.*

Lynn Jig Saw

The power tool division of Lynn Products Co., Chicago, is now distributing jig saws in limited quantities for immediate delivery.

The Lynn jig saw is lightweight and economical; husky enough to fit into industrial and school shop uses.

Model JS-120 has an overall length of 19", width 8". The 8" square heavy cast-iron table tilts through 45 degrees. The Lynn saw can be operated by any small household electric motor —1/6 to ¼ h.p., 875 rpm. It is equipped to use sabre type or regular blades.

For full information write the Lynn Products Co., 315 E. Ontario St., Chicago 11, Ill.; *or check no. 62 on the coupon.*

Carboloy Expands Boring Tool Line

A comprehensive line of seven basic styles of standardized carbide tipped boring tools, in from four to six sizes each, is now available

Each item listed above is numbered. Check the numbers of the items you want, and mail the coupon, properly filled in, to . . .

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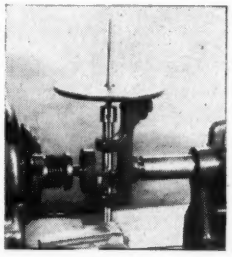
6-47

from the stock of Carboloy Company, Inc., Detroit, Michigan. Five of these styles represent additions to the previous standard stock line of round-shank square-end tools. The five new styles comprise two types of round-shank tools for 30° and 45° boring bars, in four sizes each, and three types of square-shank tools for use in 30°, 45° and 90° boring bars in six sizes each. All styles are carried in stock in grades for both steel cutting and boring of cast iron and other materials.

For complete descriptions and prices, write Carboloy Co., Inc., Eight Mile Road, Detroit, Michigan; *or check no. 63 on the coupon.*

Filing Attachment

A lathe can easily be converted into a filing machine with the aid of a new attachment developed by the Carey-Anslinger Mfg. Co., Kankakee, Ill.

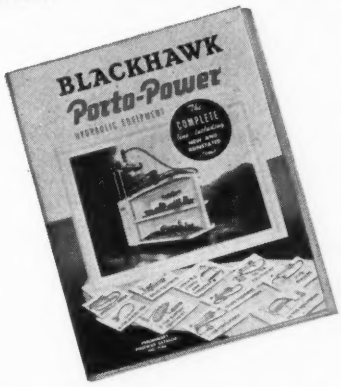


The attachment is quickly applied to any standard lathe. A tapered arbor is slipped into the tailstock and clamp shaft into three-jaw chuck or collet. The wood or metal lathe is then converted into a filing machine useful on dies, jigs, fixtures and tools, art metal and scroll work. Can be used on wood, metal, hard rubber, fibre, plastic, etc.

Complete information can be obtained from the Carey-Anslinger Mfg. Co., 1129 E. Bourbonnais, Kankakee, Ill.; *or by checking no. 64 on the coupon.*

New Blackhawk Porto-Power Catalog

The new Blackhawk catalog is more than a listing of equipment. It also includes a "catalog of uses" showing how portable hydraulic power tools can speed work in maintenance and production.



Describes uses of all-directional Porto-Power hydraulic jack equipment and pipe benders for maintenance, production, and laboratory work. Write Blackhawk Mfg. Co., Milwaukee 1, Wis. for a free copy, mentioning SCHOOL SHOP; *or circle no. 65 on the coupon.*

"Learning to Weld"

A new booklet, published by the Lincoln Electric Co. and entitled *Learning to Weld*, provides a simple, basic approach for anyone interested in making a start in arc welding. The booklet's purpose is to teach how to weld and to assist in applying arc welding to the repair of broken parts, the hard surfacing of worn parts, and the building of miscellaneous equipment.

Subjects treated include: protective clothing and equipment; striking the arc; various welding positions; types of welds; fit-up of parts; procedures for various welds; welding cast iron; hard surfacing. Four pages of illustrations show typical applications of arc welding in repair and construction. Also included are conversion tables on decimal equivalents and thicknesses of metal in both gage and inches, plus a glossary of welding terms.

Available from Lincoln Electric Co., Cleveland, Ohio, for 25c a copy; *or by checking no. 66 on the coupon, and enclosing 25c; in Canada, 35c.*

New Literature

O-P Craft Catalog No. 47, a colorfully illustrated manual of materials, showing many types and kinds of designs, plus processes and technics applicable to the decoration of O-P Craft articles. For a free copy, write O-P Craft Co., Sandusky, Ohio; *or check no. 67 on the coupon.*

Slidefilms and Motion Pictures—To Help Instructors, a new catalog of selected visual aids produced and distributed by the Jam Handy Organization. Lists discussional slidefilm kits, sound slide-films, and educational sound motion pictures for vocational training and classroom use. For free copy, write School Service Department, Jam Handy Organization, 2821 E. Grand Blvd., Detroit 11, Mich.; *or check no. 68 on the coupon.*

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and
Department Heads

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mendous task of pioneering in fields of education new to Burma, especially in these times when materials and tools are so scarce and the country is in such a state of ferment.

MRS. ERVILLE E. SOWARDS
Granville, Ohio

[EDITOR'S NOTE: Needless to say, Mr. Sowards' copy of the June 1946 Directory Issue along with the April 1947, Directory Issue, went out to him post-haste.]

Notice

If you change your teaching position for next fall, please notify SCHOOL SHOP immediately so that there will be no delay in the receipt of your magazines next fall. Please send both old and new address and specific subjects taught (i.e., grafting, woodworking, etc.—not "industrial arts"). Please send changes of address and above information to Circulation Department, School Shop, 330 South State St., Ann Arbor, Michigan.

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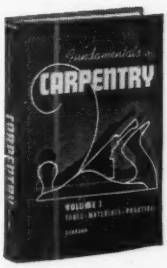

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George-Barden Funds

HERE is the latest word on that worrisome question: What about the George-Barden funds for next year?

As this is written the Office of Education has done all it could to convince Congress that the entire amount authorized by the vocational act of 1946 should be appropriated before Congress recesses for the summer. And it looks as if the money will be forthcoming by June.

If that happens, credit will be due first to the fast work of the state departments of vocational education. They worked swiftly to give the Office of Education their best and most accurate estimates of how much money they will have at their disposal for vocational education in 1948. Totaling these estimates, the Office of Education found that state and local governments plan to increase their expenditures for vocational education for 1948 to $122,000,000 (from the 1946 figure of only $72,000,000). Hence, the states will require all of the $29,300,000 which the George-Barden Act says they may have. This information was officially passed on to Congress by the Bureau of the Budget.

Next, credit is due to the valiant work of U. S. Commissioner of Education Studebaker. In a series of hard-hitting sessions with both House and Senate subcommittees, the Commissioner argued that the entire amount authorized should be placed at the disposal of the states immediately.

Last month the House had thought otherwise. Congressmen, led by Rep. Keefe of Wisconsin, held back nearly half the money which the George-Barden Act authorizes. This month, before the Senate appropriations committee, Dr. Studebaker had a chance to react to this step in these words:

"What is your policy in Congress? Do you wish to supply to any state that says it will match the money dollar for dollar the full benefits of the authorization or not? If you wish to do that, then you have to appropriate the full amount."

At this point Dr. Studebaker also had an opportunity to hit out against another pet peeve of his. That is, the yearly business of giving the states only a portion of the vocational funds to which they are entitled and later asking for deficiency appropriations. This is a method which Congress, strangely enough, seems to approve.

"You invite deficiencies when you authorize us to allot on a higher basis than the amount you appropriate," Dr. Studebaker told the Senate committee. "I never believed that was a good thing to do. . . . Congress ought to decide what we ought to apportion to the states, and it ought to appropriate that much. It ought to cut out the red tape in handling the papers for deficiencies."

Speedy settlement of these troublesome questions, once all the facts were in, was promised last month by the House of Representatives. Now the facts are in the record. Congress will be watched closely to see whether it appropriates the George-Barden money without further ado.

Apprenticeship

Many a Congressman began his working career as an apprentice. Apprenticeship is familiar and often "dear-to-the-heart" of our lawmakers. It is to be expected, therefore, that the Federal Apprenticeship Service would not suffer much when its budget is presented even to an economy-minded Congress. Compared to other federal services such as the U. S. Employment Service, apprenticeship this year will be well supported.

But Congressmen are also quick to see when federal funds are used to carry on activities which they believe should be financed by the states. The House appropriations committee, for example, noted with some chagrin that about 30 states have no apprenticeship training laws and 21 states have no agency to carry on apprenticeship activities for nonveterans. In these states, much of the work is carried on by federal agents.

Many Congressmen don't like such a state of affairs. The national head of Apprenticeship Service, William Patterson, tried to justify this by saying that federal agents "only promote or stimulate" programs in the states which do not now have either apprenticeship laws or apprenticeship agencies. To this Rep. Keefe replied:

"If the states don't want it (apprenticeship programs), then I don't know of any reason why we should be asked to appropriate any money to force it down their throats. If they don't want it, why should we continue to pester them with it?"

In short, Congress would be more generous in helping to pay for state apprenticeship activities if state officials make some effort of their own to promote this type of training, rather than rely wholly upon federal help.

National Support for Education

Even the most cautious observers in Washington predict that the day when the Federal government will step into the business of training and education on a scale bigger than ever before is nearer than most educators are willing to believe. Some say that the step will be taken with the passage of a bill guaranteeing federal aid to general education. Others say that it will be taken with the passage of universal training for youth.

One or the other step will have to be

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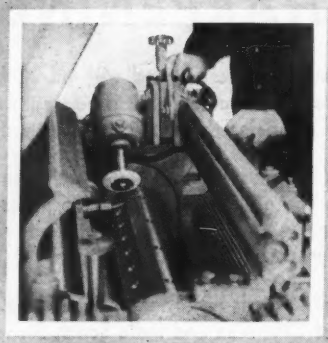

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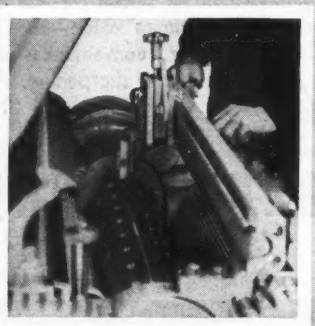

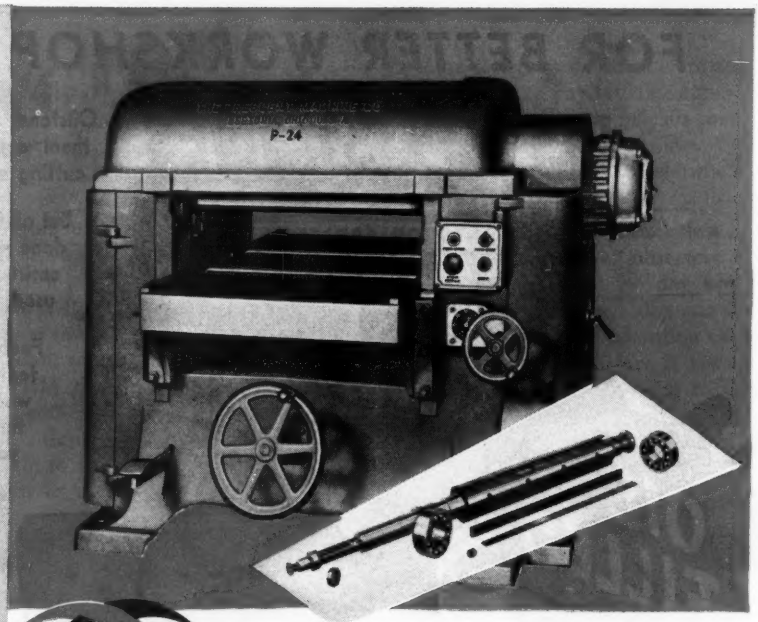

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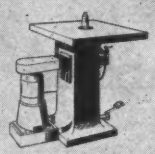
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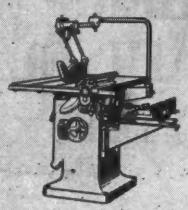
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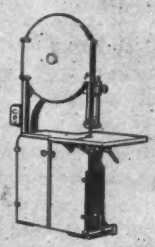
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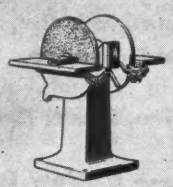
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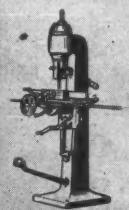
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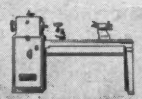
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